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POLITICAL AND SOCIOLOGICAL

POLITICAL ALLIANCE BETWEEN TANAKA, TAKEIRI ANALYZED

Tokyo SENTAKU in Japanese Jul 82 pp 50-53

[Article: "A Study of the Relationship of Sworn Friendship between Tanaka and Takeiri--as a Factor in Predicting the Political Situation"]

[Text] Although the political situation appears relatively calm on the outside, on the inside it is rather entangled. After the verdict was handed down to the defendants in the All Nippon Airways case of the Lockheed incident on 8 June, the degree of entanglement increased further.

Upon his return from a long trip that included attendance at the Versailles summit conference and the UN special session on arms reduction, Prime Minister Suzuki bluffed by saying that he would deal with management of the political situation "in the natural course." His comment has been considered an antonym disguising his tension. The political situation seems likely to emerge from its present entanglements and begin moving in the latter half of the year.

Mystery of the Forced Extension of the Diet Session

In the unstable political conditions of recent times, the words and actions of Yoshikatsu Takeiri, chairman of the Komei Party, have been talked about with an air of mystery. More precisely, people are watching for changes in the honeymoon relationship between Takeiri and former Prime Minister Tanaka. Anything can become a trigger for a disturbance in the political arena. In any case, people are not mistaken to cast suspicious eyes on the Tanaka-Takeiri relationship.

At a closed session of the Komei Party's national secretary generals' meeting held last 9 October, Takeiri spoke with full confidence: "I have done what I should do. Although the issue of allowing corporate contributions to political parties still remains, I cannot launch out that far. I feel as though I can resign the party chairmanship at any time. But I will not resign at the next party convention (December 1981)." "What I should do" meant a series of Takeiri policies which tilted to the right. They included the party's recognition of the constitutionality of the Self Defense Forces, the party's acceptance of the Japan-U.S. Security Treaty, and moreover a scheme to obtain political power that implied coalition with the LDP. Takeiri meant that he had established his tilt-to-right line in the party.

Last September, when Takeiri visited the PRC, he declared in front of the leading Chinese officials that "the Komei Party will certainly participate in an administration."

While in China, Takeiri contacted Suzumu Nikaido (then chairman of the LDP Executive Committee) at a hotel. This was spoken of for a time as "a mysterious secret meeting in Beijing." At that time some Komei Party members publicly made it clear that a scheme to obtain political power meant coalition with a force consisting primarily of the LDP's Tanaka faction. The Komei Party's recognition of the constitutionality of the Self Defense Forces was explained as necessary to reduce the gap in policies with the LDP that stood in the way of a coalition.

Takeiri dared to confirm his intention not to resign in the foreseeable future at the secretary generals' meeting. After completing the tilt-to-right line, he also wanted to realize with his own hands the Komei Party's participation in the government--that is how others view his ambition. Concerning Takeiri, who holds the longevity record--15 years--as chairman of a party in Japan and is still extending his record, whispered rumors of his resignation as the chairman have been heard at every party convention in the last several years. Last year, he denied the rumor by himself.

This year, however, the situation is different. The spreading rumors of his resignation are more realistic than ever. The trigger for the rumors was the long 94-day extension of the Diet session passed on 19 May. The Komei Party was the most strongly opposed to the long extension. Takeiri alone boycotted Suzuki's meeting with opposition party heads on 28 May, just prior to the prime minister's trip abroad. Takeiri explained his reason for the boycott as follows: "In order to pass an unconstitutional bill revising the Public Officials Election Law (revision of the nationwide electoral districts for the Upper House), the LDP forced the passage of an unprecedentedly long extension of the Diet session. I boycotted the meeting in order to protest the outrageous action of the LDP. In the following half month, the Komei Party boycotted all discussion in the Diet. Takeiri maintained a stubborn attitude that seemed abnormal. The Komei Party had been considered as an understanding, cooperative party by the LDP. But is completely changed its attitude. Takeiri's staff said: "This time is different. We do not mind being isolated in the Diet." There have even been times when Junya Yano, the party's secretary general, wondered why Takeiri was being so stubborn. Both party insiders and people outside the party suspected that Takeiri was anticipating something in his heart. That also led to rumors of his resignation. However, nobody knew what it was.

Without question, revision of the nationwide electoral districts for the Upper House will put the Komei Party in a disadvantageous position. Under the current system, the Komei Party has divided the country into nine blocs, nominated one candidate in each bloc, and elected all nine. The system is incomparably more efficient than that of other parties. If the proportional representation system proposed by the LDP is applied to the number of votes in the Upper House election in 1980, seven of the Komei Party's candidates would have been elected. The party would have lost two seats. According to

the proposed revision, people will vote for a party. Since independent voters are averse to the name of the Komei Party, the party fears that the number of votes from independent voters will decrease drastically.

Takeiri's anger, however, stemmed not just from the effect the revised law would have on the party. Until just before the long extension of the Diet session was suddenly suggested, Takeiri is said to have assured his staff that "there will be no extension. Therefore, there will be no revision of the nationwide districts. Since it is said so there (Mejiro), it is true." It has been common knowledge for some time within the Komei Party that Takeiri and Mejiro (Tanaka) have been closely exchanging information on the political situation and elections. Takeiri, being bold, has not tried to hide it.

So the long extension of the Diet session was a complete surprise to the Komei Party. Morevoer, the LDP intends to force passage of the bill to revise the nationwide districts, which the Komei Party is determined to prevent with all its power. Therefore, people assume that Takeiri was doubly humiliated. Because of his mistaken outlook on the situation, he has lost face within the party. Moreover, it will be difficult to regain party strength. In the double election to both houses in June 1980, the Koemi Party's seats in the House of Representatives fell from 58 to 34. Later, a leading member of the Democratic Socialist Party said: "Since the election was held in June, the extent of the Komei Party's damage was only that much. If the election had been held a half year later, it would not have received even 30 seats due to the troubles of the Soka Gakkai and the Ikeda scandal. It would have become the fourth opposition party." Next year's Upper House election will be the first election at the national level since the decrease in their forces. To Takeiri it will be the election that determines his party's fate. But if the system itself is revised to their disadvantage, there will be no hope for Takeiri. Moreover, the person who is promoting the revised bill is Kakuei Tanaka, with whom Takeiri is supposed to be connected by an interdependent relationship based on trust....

The View That a Cozy Relationship Still Exists

When Takeiri boycotted the meeting of the party heads, rumors that Tanaka and Takeiri had ended their relationship circulated among politicians. "It was Takeiri's retaliation for being betrayed by Tanaka. Takeiri finally seems to have abandoned his role as the Tanaka faction's detached force." Within the Komei Party, some leading members who have been concerned about Takeiri's relationship with Tanaka said: "This is a good opportunity. Isn't it a chance for us to deny publicly the suspected relationship with the Tanaka faction? What we should do now is thoroughly shake up the government and the LDP." Some thought a crack had occurred in the Takeiri-Tanaka relationship, while others expected a crack to occur in the future. At any rate, the Komei Party members felt a change was occurring in the honeymoon between the two.

On the other hand, there was a completely different view. Some in the political arena said their cozy relationship still existed. In other words,

Takeiri and Tanaka were after all connected at the level of wheels within wheels and players of a play. One ground for this view is Takeiri's remark on Diet dissolution.

At noon on 21 May, 2 days after passage of the long extension of the Diet session, the Komei Party held "An Urgent Grand Oratorical Street Meeting To Oppose Flatly an Undesirable, Unconstitutional Amendment of the Upper House Nationwide Districts" at the East Entrance Plaza of Shinjuku Station in Tokyo. On this occasion Takeiri called for dissolution of the House of Representatives, saying: "The undesirable amendment of the Upper House nationwide districts is an outrageous act against democracy. Since this issue will affect Japan's future, isn't it the right course for party politicians to ask the people for confidence rather than just discussing the issue in the Diet?"

Political circles were surprised and wondered. Every party and Diet member wants to put off Diet dissolution and general elections even if only by 1 more day in the future. Since it has been only 2 years since the previous election, the time is not yet ripe. However, one thing that concerns Diet members is the Tanaka faction's forceful method of managing the political situation. Whenever criticism of the Tanaka faction's management or of the Lockheed incident has arisen this year, the Tanaka faction has suggested Diet dissolution this year, and thereby used it as a threat. Since nobody knows when a potential threat may become a real threat, this is a first class weapon of Tanaka's.

Even after the 8 June verdict, as if rising criticism of Tanaka was guaranteed, a rumor of an election on 3 October was spread with seeming truth. For a certain time every party was restless. Takeiri's remark on Diet dissolution can be viewed as a way to keep in step with the Tanaka faction's strategy. Therefore, the view that their cozy relationship still exists cannot be denied.

Both views, that the relationship has been broken or that it still exists, however, seem to tell only one aspect of the truth. Before the 8 June verdict, New Liberal Club President Seiichi Tagawa invited the heads of the four middle-of-the-road parties to a meeting to be held just after the verdict. Takeiri, however, would not respond by saying: "When we gather, what are we going to do?" Tagawa intended to launch into an anti-Tanaka and antiplutocracy campaign in the form of an appeal by the four party heads. But Takeiri did not go along with Tagawa. It is too simple, however, to jump to the conclusion that Takeiri was trying to defend Tanaka.

The connection between Tanaka and Takeiri is certainly old and strong. When the Soka Gakkai and the Komei Party were accused of interfering with freedom of speech and press (1970), Tanaka (then LDP secretary general) tried to save Takeiri in a pinch. When Japan and the PRC normalized their diplomatic relations under the Tanaka administration (1972), Takeiri played the role of a middleman. When the Komei Party cooperates with the Socialist Party or the Democratic Socialist Party in elections, the Komei Party always takes care not to disturb the Tanaka faction's candidates. The Takeiri and Tanaka relationship is almost indivisible.

After a miserable defeat in the 1980 double election, the Komei Party was further attacked on the issue of summoning Daisaku Ikeda to the Diet. "A Group To Inquire into the Soka Gakkai's Social Wrongs" collected 500,000 signatures and filed a petition through an LDP Diet member to summon Ikeda to the Diet. This time, too, Tanaka encouraged the weak Takeiri by saying: "Don't worry. Think of me when I was severly accused in the Lockheed case." Then, Tanaka is said to have warned Yoshio Sakurauchi, then LDP secretary general, "not to be drawn into the petition summoning Ikeda to the Diet." This time, it was Tanaka who has found himself in a pinch. If their close relationship is revealed more clearly than ever, however, criticism of Tanaka becomes criticism of the Komei Party. If Takeiri handles the situation unskillfully, it may render the rebuilding of party strength impossible. Takeiri seems to have fallen into a dilemma, and his inner struggle seems to have intensified.

"Only I Can Make Tanaka Retire"

When the movement to merge the four middle-of-the-road parties suggested by Democratic Socialist Party Chairman Ryosaku Sasaki ran into trouble in the spring of last year, Takeiri, who had been cool toward the idea from the beginning, told his staff: "By any stretch of the imagination, it will be the Tanaka-Ohira group if we pair up with the LDP. Although (Ikko) Kasuga is dealing with the Fukuda and Nakagawa group, I cannot do likewise. Even if the four parties merge, and the resulting party ends of cooperating with Fukuda under Kasuga's leadership, we will lose the purpose behind the merger of the four parties. Nikaido is opposing to a new middle-of-the-road party. He is concerned that the new party emerging from the merger of the four would take an independent course as a new power. That may be the case. Although the Komei Party's seats are limited to 30 or 40, the Tanaka faction may want us to remain as we are to provide insurance. However, Tanaka may not be albe to recover. Even if we make him retire, who is going to persuade him? It may be only me who can do so. Then, I will also resign..." This story is so good that its truth is difficult to ascertain. Even if we assume that Takeiri really said this, it does not necessarily mean that Takeiri harbors the same feeling now.

From Takeiri's remarks it is clear that the Tanaka-Takeiri relationship is involved even in the issue of the merging of the four middle-of-the-road parties; therefore, Takeiri, who is on Tanaka's side, cannot agree with the Democratic Socialist Party, which is close to Fukuda. For this reason, when Tagawa recently made clear his anti-Tanaka and antiplutocracy position, approached Fukuda and Miki, and asked the Komei Party and the Democratic Socialist Party to go along with the New Liberal Club, it was an annoyance to Takeiri.

Moreover, the Democratic Socialist Party and the New Liberal Club are strongly averse to the Komei Party. At a meeting in Hawaii of the four party s secretaries general (14 June), both parties suggested the idea of merging three middle-of-the-road parties without the Komei Party. When Yano heard the story, he had to say that "it has its own meaning." Nevertheless, he could not hide his feeling of isolation. When Yano was once asked about the

merger of the four middle-of-the-road parties and the other parties' antipathy to the Komei Party, he said in a rage: "The Komei Party was founded and raised by Soka Gakkai. I want everybody to take that fact as a premise. If they tell us 'to cut off our relationship with Soka Gakkai' or interfere with our freedom of religion, it will be unsolicited advice. In that case they will have to give up the idea of a merger of the four middle-of-the-road parties." But the Soka Gakkai has been shaking. The party's forces are stagnant. It is isolated within the middle-of-the-road forces. Under these adverse circumstances, the Komei Party is even burdened with damage to its image inflicted by the two persons most criticized by the public--Kakuei Tanaka and Daisaku Ikeda. The Komei Party is in an extremely difficult situation. Takeiri is anxious to find a way out of the difficulty.

Takeiri's "Last Match"

Concerning Takeiri's state of mind, one Komei Party leader explained:

"Mr Takeiri is angry with Mr Tanaka for betraying him on the issue of the Diet extension. However, many things happen in the political arena. Whether or not Mr Takeiri will break his relationship with Mr Tanaka over that sort of problem is a question that belongs to a different level. What Mr Takeiri is most concerned about is how to rebuild the party and the Soka Gakkai. That is all that concerns him. Since he is a warmhearted man, he will think extensively of his relationship with Mr Tanaka. But there is no question that he places priority of the Soka Gakkai and the Komei Party. In this context he should be thinking of bringing the Tanaka issue and the issue of his own retirement to a conclusion. This is the last match where he puts his future and office at stake--I think he is in such a state of mind."

If so, Takeiri's previous remark about resignation together with Tanaka seems to be a realistic synopsis. By not being anti-Tanaka, but by adopting a role that makes Tanaka retire, he can try to elevate the Komei Party--this is certainly a drastic measure.

The matter is, however, not so easy. Even if Takeiri intends to do so, Tanaka's ambition lies elsewhere. Just before the 8 June verdict, Tanaka gave a big talk at a meeting with Nakasone faction members (3 June). "If Nakasone waits quietly and patiently for the moment, he can become LDP president. When I ran for LDP president in 1972, Nakasone supported me. I have not repaid him yet. The time will certainly come for me to repay him. In 5 years or so, I also want to ask for your help again." He meant he would cooperate with the Nakasone faction in order to anoint Prime Minister Nakasone, but in exchange he asked for their help in his own restoration 5 years later. Tanaka showed no sign of retiring. Knowing all Tanaka's intentions very well, Takeiri must be thinking of all the possibilities.

After thought, Takeiri may after all choose a safe course, or he may try his luck for the sake of the party's revival. Takeiri's move on the Tanaka issue is one factor to watch in predicting the political situation.

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INTERNATIONAL COMPARISON OF LABOR PRODUCTIVITY REPORTED

Tokyo NIHON SEISANSEI HOMBU in Japanese 6 Jul 82 pp 1-8

[Article by Kazukiyo Kurosawa]

[Text] The Nihon Keizai Hombu (Japan Productivity Center; president, Kohei Goshi) recently completed a "Research Study on International Comparison of Labor Productivity." This report is an international comparison of trends and absolute standards of labor productivity based on the real added value.

The study was carried out by the Special Committee on International Comparison of Productivity (chairman, Kazukiyo Kurosawa, professor at Tokyo Institute of Technology) established within the center to carry out contractual study for the Zaidanhojin Sangyo Kenkyujo (Industrial Research Foundation).

Views on Research Study

The international comparison of labor productivity up to now has been conducted mainly by comparing the growth rate (trends) of various nations' productivity. This method enables a comparison of growth rate of productivity but does not show the fluctuation of the absolute standard of productivity.

Therefore, attempts to make comparisons between specific countries have been made at times by measuring the absolute standard of productivity, but only partial or fragmentary results were obtained. Broad measurements of various categories of the economy in many countries were lacking.

In the midst of recent worldwide economic stagnation, various nations are trying to promote economic recovery through improved productivity. For this reason, there is increasing interest in various nations in knowing their position in productivity by making a comparison of the productivity level.

This is an attempt to respond to this interest by measuring the trend in labor productivity as well as the absolute standard of industries and economy as a whole using a uniform method, and on a continuing basis. This is an unprecedented attempt.

Extent of Measurement

1. Labor Productivity of Principal Industries and Economy as a Whole

Targeted Countries:

Europe and United States:		Japan, United States, West Germany, France, England, Belgium
Asia	:	Japan, South Korea, Pakistan, Singapore, Philippines, Thailand

Comparison Year:

Europe and United States:		1970 - 1979
Asia	:	1971 - 1978

Measurements for certain years could not be made on certain countries due to lack of basic data.

Area of Comparison:

1) Economy as a whole; 2) agriculture, forestry and fishery; 3) mining; 4) manufacturing; 5) electricity, gas and water; 6) construction; 7) transportation and communications; 8) commerce and service industry.

Measurement Index:

GDP (Gross Domestic Production) per employee in each case.

2. Labor Productivity of manufacturing industries by categories

Targeted countries:

Japan, United States, West Germany, England

Comparison Years:

Japan-United States:		1967 - 1978 and projected estimate for 1979, 1980
Japan-W. Germany	:	1975 - 1978
Japan-England	:	1970 - 1979

Measurement Index:

Japan-United States:		value-added per capita
Japan-W. Germany	:	value-added per employee
Japan-England	:	value-added per employee

Measurement Method

1. This survey from beginning to end is a measurement of rough value added labor productivity. In other words, the rough added value of each country and category were converted to the real rough added value based on the 1973

price indicator (1973 price for Asian countries) and divided by the number of employees in each category.

However, total working hours were used in the comparison of manufacturing industries by categories between Japan and the United States.

2. A statistical system of real GDP of each country was used for the rough added value of principal industries.

As for manufacturing industries, the output (or shipment) and the amount of raw materials purchased were divided by the cost index, and the difference was used as the real rough added value (double deflation method).

3. Following this, the rough added value of each country based on the UN calculation of purchasing power parity (PPP) against the 1973 GDP were converted into Japanese yen. However, due to lack of PPP for Asian countries, the average exchange rates of the 5 years 1973-1977 were used. Moreover, the 1973 exchange rate was used in the comparison of manufacturing industries between Japan and the United States.

4. Sources for basic data used are as follows:

Real GDP by Industries

Europe and United States: OECD, "National Accounts of OECD Countries:
Asian countries : UN, "Yearbook of National Accounts Statistics"

Number of Employees by Industries

Europe and United States: OECD, "Labor Force Statistics"
Asian countries : ILO, "Yearbook of Labor Statistics"

Comparison of Manufacturing Industries

Japan : MITI, "Industrial Statistics" (output, cost of raw materials, number of employees)
Ministry of Labor, "Monthly Labor Statistics" (working hours)
United States: Bureau of Labor Statistics, "Census/Annual Survey of Manufacturers" and unpublished data on working hours, investment, output deflator, etc. by BLS
West Germany : Bureau of Statistics, "Statistics Yahrbuch"
United States: BLS, "Business Monitor, PA-1000

Outline of Calculation Results

The calculation results based on the above method are as given below.

(Table 1, Figure 1) Comparison of Labor Productivity Growth of Advanced Nations

Table 1. Labor Productivity Growth Rate by Industry of Advanced Nations (1973 = 100)

Countries (Yrs)	Japan (1979)	U.S. (1979)	W. Germ. (1978)	France (1979)	England (1978)	Belgium (1979)
Overall industry	119.3	101.1	117.1	118.4	104.6	114.9
Agr, Forest, Fish	109.9	114.1	126.1	128.0	115.3	114.5
Mining	111.0	73.8	90.8	118.2	222.1	108.8
Manufacturing	145.1	106.9	115.9	127.0	103.6	135.5
Elec, Gas, Water	130.5	96.5	126.0	131.2	111.1	150.6
Construction	94.3	90.2	117.6	105.3	98.6	108.4
Transp, Commun	114.3	114.4	124.7	120.5	107.5	103.2
Commerce, Service	108.5	98.8	114.5	109.7	102.0	104.9

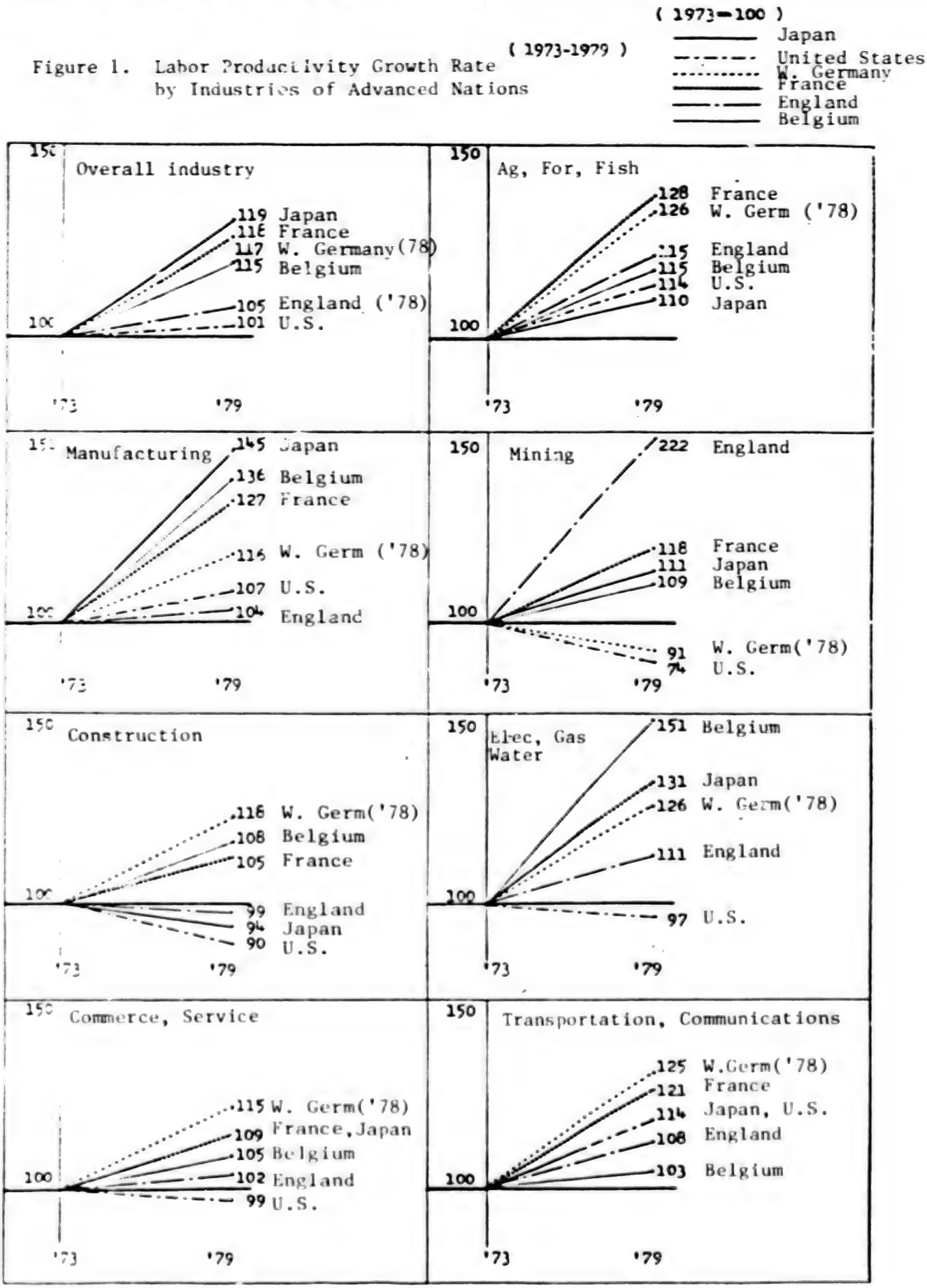
(Note) This table shows real GDP index per employee based on 1973 = 100

Among the industries of the advanced nations, Japan's index of 119.3 for the growth rate of labor productivity since 1973 is the highest for 1979 (1978 for West Germany and England), followed closely by France (118.4), West Germany (117.1) and Belgium (114.9). England (104.6) and the United States (101.1) remained in extremely low positions, showing a conspicuous difference from the other four countries.

Conditions differ according to industries. Japan's high growth rate is based on the manufacturing industrial growth of 145.1, followed by Belgium (135.5) and France (127.0) which also show relatively high rates of growth. West Germany with 115.9 shows a medium rate, but the United States and England remained sluggish at the single-digit growth level.

Following manufacturing industry, Japan shows a large growth rate of 130.5 in electricity, gas and water industries, but remains in third place, following Belgium with 150.6 and France with 131.2. The United States is rather low at 96.5.

Figure 1. Labor Productivity Growth Rate (1973-1979)
by Industries of Advanced Nations



As for agriculture, forestry, fishery, mining, transportation, communications, commerce and service industry, Japan's growth is in the medium range among the countries being compared. The construction industry at 94.3 is lower than the 1973 level. This was also true of England and the United States. In general, the United States and England showed stagnant growth, but France, West Germany and Belgium had comparatively good rates of growth.

It is clear that the overwhelming growth of the manufacturing industry played a large part in Japan's favorable growth.

(Table 2, Figure 2) Comparison of Labor Productivity Level of Advanced Countries

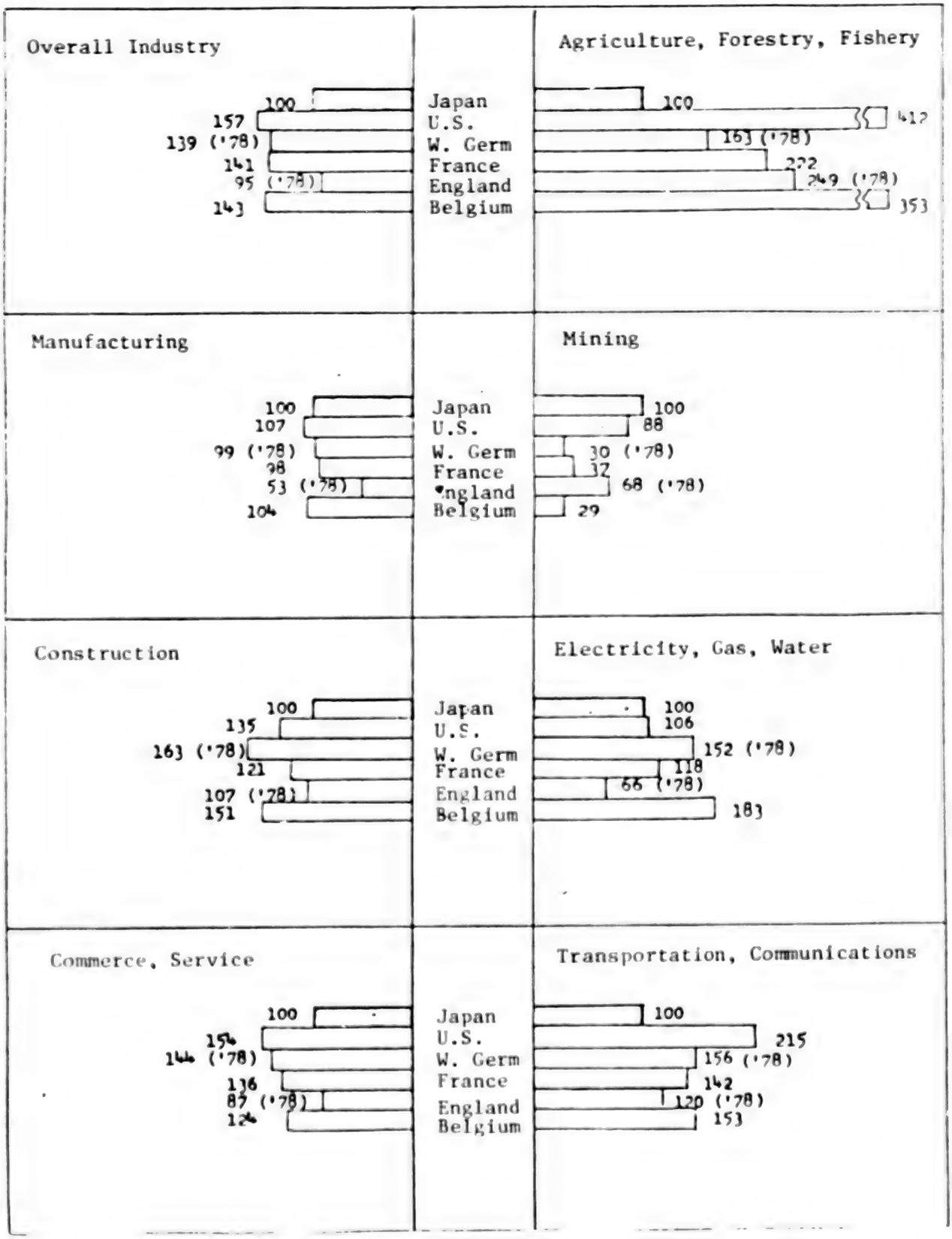
Table 2. Comparison of Labor Productivity Level by Industries of Advanced Nations

Countries (Yrs)	Japan (1979)	U.S. (1979)	W. Germany (1978)	France (1979)	England (1978)	Belgium (1979)
Overall (1000 yen)	2.552	4.009	3.417	3.606	2.332	3.640
Industry (Comp)	100	157	139	141	95	143
Agr, For, Fishery	1.040	4.287	1.561	2.306	2.395	3.672
	100	412	165	222	249	353
Mining	7.013	6.154	1.721	2.614	3.946	2.040
	100	88	30	37	68	29
Manufacturing	3.969	4.261	3.618	3.872	1.949	4.127
	100	107	99	98	53	104
Electricty, Gas, Water	7.440	7.919	10.749	8.760	4.657	13.645
	100	106	152	118	66	183
Construction	1.986	2.688	3.313	2.410	2.174	2.991
	100	135	163	121	107	151
Transportation Communication	2.361	5.071	3.574	3.341	2.744	3.605
	100	215	156	142	120	153
Commerce Service	2.516	3.872	3.528	3.417	2.137	3.123
	100	154	144	136	87	124

Note: Upper figures in each category show real GDP per employee in Japanese yen of 1973
Lower figures show comparative values using 100 for Japan

Currency conversion based on purchasing power parity of GDP of 1973 computed by UN, or 1 dollar = 3.09 DM = 4.52 francs = 0.341 pound = 38.6 Belgian francs

Figure 2. Comparison of Labor Productivity Level by Industries of Advanced Nations (Japan = 100)



On the other hand, a comparison by standard value shows that the United States, which had the lowest growth rate, came out on top, and as of 1979, the United States surpassed Japan in overall industries by 1.57 times. Belgium (1.43 times over Japan), France (1.41 times) and West Germany (1.39 times) followed the United States closely. England alone was lower (95 percent of Japan), but in general, Japan's labor productivity level could not be termed high.

Japan is lowest in agriculture, forestry and fishery, showing a considerable gap from the other countries. The top ranking United States is four times higher than Japan.

Japan is highest in the mining industry, followed by the United States (88 percent of Japan) and England (68 percent of Japan), but the level of the other three countries is quite low.

The United States is 7 percent higher than Japan in the manufacturing industry; the other countries, with the exception of England (53 percent of Japan) are generally on the same level as Japan.

In the electric, gas and water service industries, Japan's productivity maintained the highest growth, but it is still low according to the standard value, showing considerable gaps as compared with Belgium (1.83 times over Japan) and West Germany (1.52 times).

West Germany has the highest growth in the construction industry (1.63 times over Japan) and Japan is the lowest.

Japan is also the lowest in the transportation and communications industries, and the United States is the highest, surpassing Japan by 2.15 times.

The United States maintained the highest growth in the commerce and service industries (1.54 times over Japan). Although Japan is higher than England, Japan shows a gap of about 40 percent compared with France and West Germany.

By and large, Japan has achieved the level of Western Europe in the mining industry, but with the exception of England, there is a considerable difference in other industries.

(Tables 3 and 4) Trend and Standard Value of Labor Productivity of Asian Countries

The labor productivity index (Table 3) based on 1973 as 100 shows that South Korea, with growth of 122.4, is the highest in overall industries for 1978 (1977 for the Philippines), followed by Japan with 112.4. A 10-percent gain for Pakistan, the Philippines and Singapore is seen, but Thailand's gain of 105.4 is very low.

The trend according to industries of each country shows that Japan had the greatest growth in mining (140.3) and in manufacturing (132.5), but dropped in agriculture, forestry, fishery, construction, transportation and communications.

Table 3. Labor Productivity Growth Rate of Asian Countries by Industry (1975 = 100)

Countries	Japan (1978)	S. Kor (1978)	Pakistan (1978)	Singapore (1378)	Philip-pines (1977)	Thailand (1978)
Overall industry	112.4	122.4	110.7	109.5	110.2	105.4
Agri, Forest, Fish	97.9	113.7	101.9	106.9	118.9	92.9
Mining	140.3	66.9	116.5	261.7	82.0	80.5
Manufacturing	132.5	123.8	107.0	107.5	107.3	135.4
Elec, Gas, Water	104.6	189.6	127.7	134.0	92.0	101.5
Construction	98.1	109.6	109.3	76.2	113.8	87.0
Transp, Commun.	99.9	111.6	116.7	136.6	92.7	128.0
Commerce, Service	106.5	110.2	111.3	108.3	97.9	101.3

Note: This table shows real GDP index per employee based on 1975 as 100

South Korea showed a large gain in manufacturing (123.8) and electric, gas and water (189.6), reflecting a rapid expansion of industrialization.

Singapore's growth of 107.5 in manufacturing is surprisingly low. The Philippines showed a slight gain in agriculture and construction, but it was sluggish in manufacturing and lower in other industries. Thailand gained largely in manufacturing (135.4) and transportation and communication (128.0), but remained stagnant in other areas.

From the standard value comparison (Table 4), Japan's level is overwhelmingly high. Singapore, in second place, is 64 percent of Japan based on overall industries, with South Korea at 20.5 percent, the Philippines at 11.6 percent, and Thailand and Pakistan are extremely low at less than 10 percent.

Standards by industries show that Singapore's growth of 1.5 times that of Japan in agriculture, forestry and fishery is an exception but Singapore still maintains relatively high level in other industries. But other countries remain at fairly low levels. The high level maintained by Singapore in agriculture is believed to be from the horticultural crops.

Table 4. Labor Productivity Growth Rate of Asian Countries by Industry (1975 = 100)

Countries	Japan (1978)	S. Korea (1978)	Pakistan (1978)	Singapore (1978)	Philippines (1977)	Thailand (1978)
Overall industry	3.187 100	652 20.5	206 6.5	2.060 64.6	357 11.6	240 7.5
Agr. For, Fish	1.204 100	324 26.9	100 8.3	1.829 151.9	206 17.3	90 7.6
Mining	6.807 100	1.047 15.4	1.046 15.4	4.661 68.5	1.340 25.3	3.061 45.0
Manufacturing	4.355 100	921 21.2	222 5.1	1.864 42.8	792 19.7	757 17.4
Elec, Gas Water	9.811 100	4.330 44.1	629 6.4	4.416 45.0	910 9.6	1.120 11.4
Construction	2.935 100	677 23.1	247 8.4	2.421 82.5	736 26.3	913 31.1
Transportation Communications	2.871 100	1.188 41.4	281 9.8	2.478 86.3	347 12.0	808 28.2
Commerce Service	3.346 100	765 22.9	324 9.7	2.028 60.6	381 11.7	543 16.2

Notes: Upper figures in 1,000 yen show real GDP per employee in Japanese yen of 1975

Lower figures show comparison using Japan = 100

Currency conversion based on 5 year average of exchange rates between 1973-1977: 100 yen = 157.9 won = 3,479 rupees = 0.8531 Singapore dollars = 2.50 pesos = 7,167 baht

(Table 5) Comparison of Labor Productivity by Types of Manufacturers in Japan and the United States

From the standpoint of man-hours, the difference in the value added labor productivity showed that the United States was 2.09 times greater than Japan in 1970, but it diminished to 1.38 times by 1980. This shows Japan's faster growth in productivity during this period. Despite Japan's rapid growth in productivity of manufacturers, the United States maintains a 38 percent higher level than Japan.

Table 5. Comparison Value-Added Labor Productivity of Japan-U.S. Manufacturing by Categories

	1970	1973	1978	1980 (est.)
Overall manufacturers	209	187	153	138
Foods	278	247	212	225
Textile	207	171	144	136
Clothing	217	220	246	259
Wood, wood products	185	231	153	137
Furniture, furnishings	147	171	168	n.a.
Pulp, paper, etc.	177	169	203	209
Publ, printing	169	202	217	n.a.
Chemicals	160	150	120	112
Oil, coal production	162	110	n.a.	n.a.
Rubber production	227	179	153	137
Leather production	158	171	193	200
Ceramics	213	179	162	155
Iron and steel	162	110	79	66
Nonferrous metals	114	123	150	142
Metal products	248	201	176	181
General machinery	191	190	141	128
Electrical equipment	236	182	124	105
Automobiles	238	206	121	99
Trans equip(except auto)	198	160	140	n.a.
Precision machinery	346	294	200	116
Other	258	237	187	n.a.

Note: Comparison made by calculating real rough-added value per person/hour using double deflation method from Japan-U.S. industrial statistics

Yen-dollar conversion based on 1973 exchange rate of $1 = 272.2 yen

According to the 1980 level by industries, Japan showed the highest growth in the iron and steel industry, while the United States remained at the level of 66 percent of Japan. In contrast, Japan is the lowest in the clothing industry (1:2.6 of the United States), with other industries falling in between.

The reason for Japan's higher level as compared with the United States is because of the automobile industry (U.S. level at 99 percent of Japan) in addition to the iron and steel industry, although the United States is higher in other types (of manufacturing). The types approaching the U.S. level are in electrical machinery (105 percent over Japan), chemical industry (112 percent), precision machinery (116 percent), general machinery (128 percent), etc. Among these, precision machinery, in which the United States led Japan by 3.46 times in 1970, has narrowed down to 1.16 times in 1980. The increase in Japan's productivity was spectacular during this period. On the other hand, there are types which show greater disparity between Japan and the United States since

1978, such as in the clothing industry, household furniture and furnishings, pulp-paper and paper processing equipment, printing and publishing, leather and leather products, nonferrous metals, etc.

As a whole, the level of traditional industries remained low and the productivity level of heavy chemicals and high industrial processing industries gained, and the latter have either reached or surpassed the level of the United States.

(Table 6) Comparison of Labor Productivity by Types, Japan-West Germany and Japan-England

Table 6. Comparison of Value Added Labor Productivity of Japan-West Germany and Japan-England by Categories

	W. Germ (1978)	England (1979)
Overall manufacturers	78	57
Foods	103	59
Textile	66	54
Clothing	117	102
Wood, wood products	110	60
Furniture, furnishings	118	84
Pulp-paper, etc.	93	62
Publ, Printing	55	—
Chemicals	60	52
Oil products	173	—
Rubber products	52	—
Leather, leather prod.	93	—
Ceramics	97	70
Iron and steel	73	20
Nonferrous	91	52
Metal products	69	64
General machinery	60	49
Electric equipment	77	46
Office equip, calcula.	119	—
Transport equip	—	25
(auto etc)	48	26
Precision study	75	65
Other	76	—

Notes: Comparison made by calculating the real rough added value per person at 1973 price using double deflation method from industrial statistics of various countries.

Conversion of yen-mark and yen-pound based on 1973 GDP purchasing power calculated by UN (1 DM = 83.2 yen, 1 pound = 754 yen).

Automobiles include two-wheel motorized vehicles and bicycles.

West Germany's level of value added labor productivity per person in 1978 was 78 per cent of that of Japan, and the level in England was 57 percent of Japan's in 1979. England, in particular, was quite low. According to the types of manufacturing in West Germany and England, some types have a higher productivity level than Japan, but most of them are lower.

England's level in all types of those surveyed is lower than that of West Germany.

The types of manufacturing in which Japan has higher productivity include the automobile industry (United States at 48 percent, England at 26 percent of Japan) and iron and steel works (73 percent for West Germany, 20 percent for England), indicating a very low level for England. Japan holds a high position in general machinery (60 percent for West Germany, 49 percent for England), chemicals (60 percent for West Germany, 52 percent for England) and electrical machinery (77 percent for West Germany, 46 percent for England).

Japan also maintains a fairly high position in the textile industry (66 percent for West Germany, 54 percent for England).

However, Japan is slightly lower in the clothing industry, with West Germany holding at 117 percent and England at 102 percent.

In general, it can be seen that Japan maintains a stronger position in the high processing and high value added types of industries.

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ECONOMIC ASPECTS OF NUCLEAR ELECTRIC POWER GENERATION NOTED

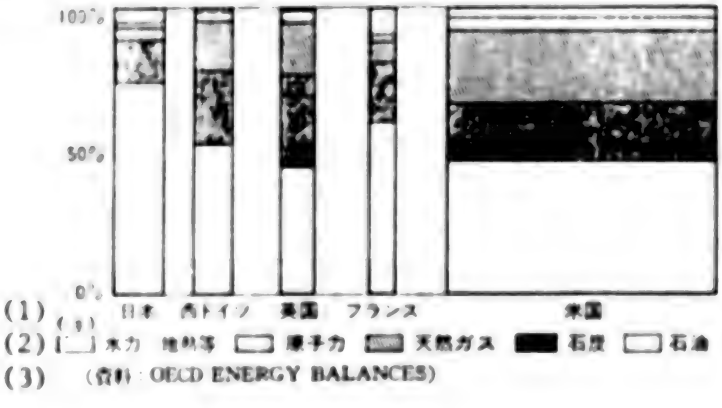
Tokyo ENERUGI FORAMU in Japanese No 329, Vol 28, May 82 pp 30-36

[Article by Horishi Takahashi:"Evaluation of Nuclear Electric Power Generation From the Standpoint of Economic Aspects"]

[Text] (1) The Position of Nuclear Power Generation

While our country's dependence on oil has been lower in recent years in terms of the overall energy supply structure, in 1980 we were still 66 percent dependent on oil and, as shown in Table 1-1, among the major advanced countries, we had the highest level of dependence. Furthermore, our nation's energy supply was 86 percent dependent on foreign sources, which was also the highest level among these nations for such dependence. With such a poor energy supply picture as a backdrop, in order for our country to assure for itself a stable energy situation, it is essential that we actively promote the development and introduction of alternative energy sources to oil. There are many excellent qualities attributable to nuclear energy, but here I would like to evaluate its economics from a broader vantage point, taking into consideration its economic security as well as its economic impact on society.

Table 1-1. Energy Supply Structure of Major Countries (1979)



Key:
(1) Japan West Germany Great Britain France United States
(2) Remarks: Hydroelectric/Geothermal Nuclear Energy Natural Gas Coal Oil
(3) Source: OECD Energy Balances

The foremost characteristic of nuclear energy is the stability of supply. Although nuclear fuel, like oil, is unvoidably dependent on supply from foreign sources, most of the supplier countries are politically stable, and at the same time the long-term availability of such supplies can be considered high in comparison to oil since we have concluded long-term purchase contracts with these countries. Also, in comparison with thermal electric power generation, very little nuclear fuel is required to produce an equal amount of electricity. Therefore, the merits of easier transportation and storage are also factors to be considered. Also, in nuclear electric power generation, once the fuel is loaded, there is no need to replace it for at least a year, which gives it another storage advantage.

In addition, when viewed in the long range in Japan, the establishment of an independent nuclear fuel cycle through reprocessing of spent nuclear fuel and the development and use of newer type reactors, nuclear electric power takes on the characteristics of being a semidomestic energy resource. If the fast breeder reactor is developed, the potential for use of uranium resources will take a quantum leap forward. Viewed in this manner, we can place nuclear power in the category of a long-range, stable energy resource.

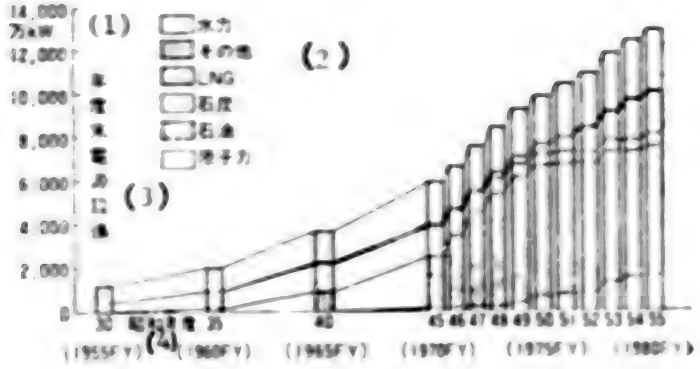
As a second major characteristic of nuclear power generation, compared with other forms of electrical supply, we can point to the fact that the per-unit cost is considerably lower. In other words, economical in the narrowest sense. The peaceful utilization of nuclear energy requires the highest degree of technological standards and presupposes the attainment of safety as a prime requisite. Therefore, many technical requirements are placed on its development in order to assure adequate safety measures, which in turn requires considerable cost. However, even when such costs are factored into the picture, when we compare nuclear power with other forms of power generation, we find that it can still be supplied at a considerably cheaper per-unit price. I will address this matter later in the article.

Third, it contributes to the advancement of industry and the economy. The nuclear electric power industry is a model of the high-technology intensive industrial system comprising electric power generation and its peripheral equipment industries, including nuclear fuel cycle related industries. We can anticipate that this will form the basis for upgrading our domestic industrial structure and contribute greatly to its development.

Fourth, there is the characteristic that nuclear electric power generation plants do cause repercussions and have an effect on the economy and social structure of the area in which the plants are located. The construction of a nuclear power facility affects a wide field of activity, including the population, employment, business and finances of a region, giving rise to a vigorous spirit of building in major local areas.

With these four major characteristics as a background, our nation's nuclear electric power generation, from the time our first commercial power generator unit went on line in 1966, as shown in Table 1-2, has steadily grown to the current level of 22 operating electric power plants with a 1,551-megawatt capacity. In 1980 electrical power provided by nuclear power generation reached

Table 1-2. Yearend Levels of Electric Power Capacities (commercial users)



Key: (1) 10,000 kW
(2) Hydroelectric
Other
LNG
Coal
Oil
Nuclear
(3) Yearend power capacities
(4) Showa Year

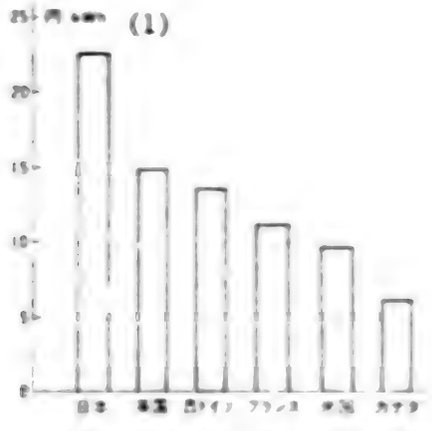
the level of approximately 82 billion kWh, or about 16 percent of the total electrical supply, thus assuring itself a firm place in the lifestyle of our nation.

(2) The Economic Efficiency of Nuclear Power in Japan

Now, with the question of external trade frictions a great topic in Japan, and with presentday electric power costs in Japan being among the highest among the world's major countries, our domestic industrial sector, particularly the basic raw materials handling industries which are the high-volume users of electrical power, have felt great repercussions and are confronted with many problems. Of course, in the future Japan must change the industrial structure in order to cope with the era of high energy costs, and at the same time it will still be necessary to promote energy conservation. It is a very important factor to actively try to hold down the rise of energy costs in general in the future, and in particular the cost of electric power. A comparisons of consumer electrical costs for the major countries of the world is given in Table 1-3.

Of course, in these comparisons we must take into account the differences in the pricing structures of the various countries as well as the differences resulting from monetary exchange rate fluctuations. However, generally speaking, I believe that Japan's electrical energy costs are in the highest categories. The difference in levels of electrical energy costs are the result of differences in the structuring of the energy production of each country, and, as shown in Table 1-4, we can see once again that having usable, plentiful and cheap domestic resources greatly contributes to the lowering of electrical energy cost levels.

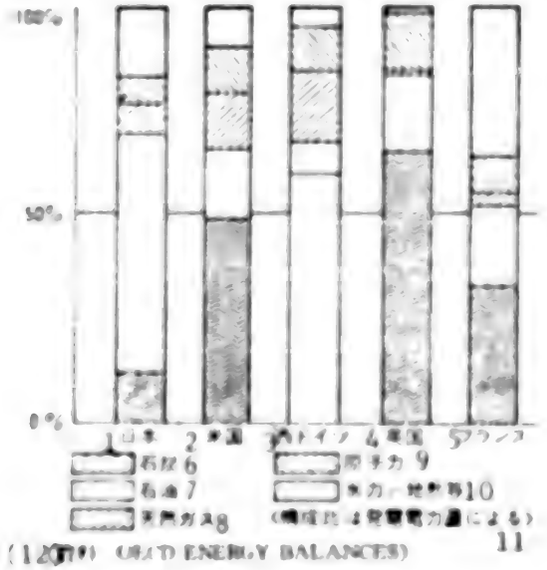
Table 1-3. Unit Consumer Cost Comparison of Major Countries (1980)



Note: Canada figures are for 1979

Key:
(1) Yen/kWh
(2) Japan
(3) Great Britain
(4) West Germany
(5) France
(6) United States
(7) Canada

Table 1-4. Types of Fuel Used for Power Generation by Major Countries (1979)



Key:
(1) Japan
(2) United States
(3) West Germany
(4) Great Britain
(5) France
(6) Coal
(7) Oil
(8) Natural gas
(9) Nuclear
(10) Hydroelectric/geothermal
(11) (Comparisons based on volume of power produced)
(12) Source:

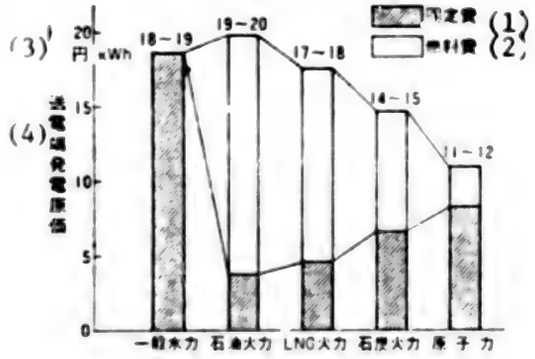
By constrast, for Japan, which has virtually no domestic energy resources, if we were to take away nuclear electric power we would have left mainly coal and LNG in the short run as alternative energy sources to oil. We would therefore still be dependent on foreign sources of fossil fuels. This situation would not change even for the medium term outlook. In other words, if we were to consider the insecurity of price spirals of coal and LNG import prices as contingent rises following the upward costs of oil, then as far as Japan is concerned, nuclear electric power generation can be considered as contributing more toward the stabilizing of energy costs than in other countries of the world.

Regarding Nuclear Electric Power Generation Costs

(1) Cost of Electric Power Generation and Nuclear Energy

In order to get a better grasp of the economic efficiency of nuclear electric power generation we used the Energy Resources Agency's estimated model prices and compared the power generation costs by different energy sources. As Table 2-1 shows, in electric power generation plants which started operation in 1981, their first-year production costs at the supply point were 11-12 yen per kWh for nuclear energy, 14-15 yen per kWh for coal-fired energy, 17-18 yen per kWh for LNG energy, and 19-20 yen for oil energy. Nuclear energy can easily be seen to be far superior as an alternative energy source compared to oil.

Table 2-1. Cost of Energy From Different Sources (facilities started in 1981)

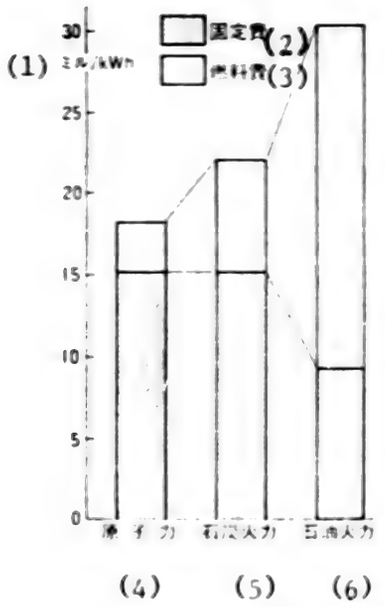


Key:

(1) Fixed costs
(2) Fuel costs
(3) Yen/kWh
(4) Cost at supply point
(5) Hydroelectric
(6) Oil
(7) LNG
(8) Coal
(9) Nuclear

Table 2-2 and Table 2-3 provide a comparison of energy costs by types of fuel in the United States and France, and the same trends are observable.

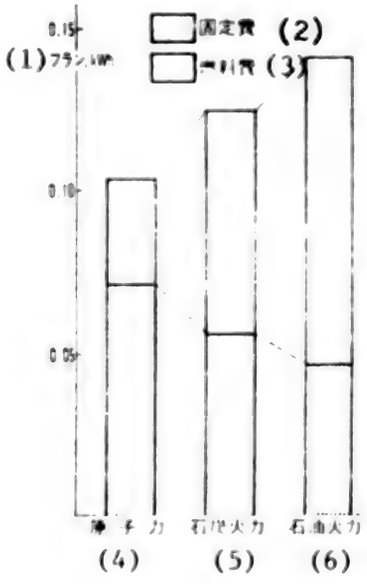
Table 2-2. Electrical Costs for Base Loading Generating Plants in the United States (to start operation in 1985)



Key:
(1) Yen/kWh
(2) Fixed costs
(3) Fuel costs
(4) Nuclear
(5) Coal
(6) Oil

Source: FEA National Energy Outlook (1976)

Table 2-3. Average Electrical Costs for Base Loading Generating Plants in France (to start operation in 1990; 1978 costs)

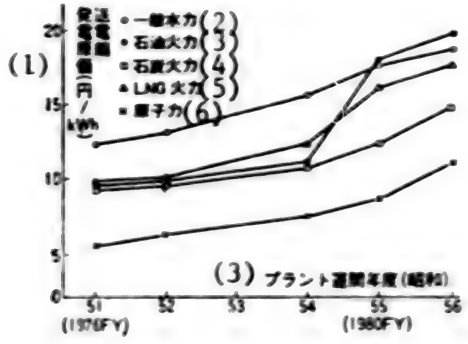


Key:
(1) Franc/kWh
(2) Fixed costs
(3) Fuel costs
(4) Nuclear
(5) Coal
(6) Oil

Source: French Electrical Ministry (1978)

The trend as seen in Japan, particularly as shown in Table 2-4, has developed as an aftereffect of the second oil shock.

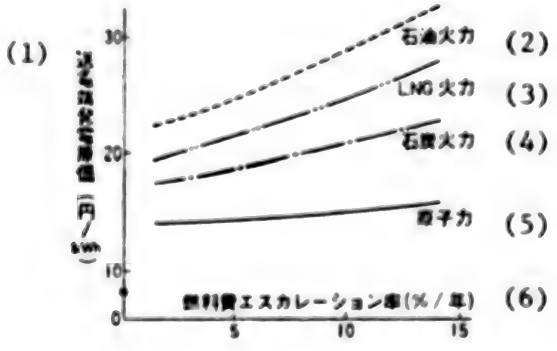
Table 2-4. Trends in Electrical Production Costs in Recent Years (based on estimates)



Key:
(1) Cost at point of supply (yen/kWh)
(2) Hydroelectric
(3) Oil
(4) Coal
(5) LNG
(6) Nuclear
(7) Year of plant operation (Showa)

In other words, with oil prices more than doubling in 2 years, as a cause and effect of this, the cost of LNG and coal showed an upward trend. In those areas where fuel costs held a major share in the pricing of electrical energy production, the costs were reflected immediately in a rising cost of the energy produced. As a result of this the fuel cost factor with regard to the energy production unit costs for the various methods of electrical power generation is ever increasing, as shown in Table 2-1 earlier. Using the model estimated prices, the fuel cost factor is 25 percent for nuclear energy, 80 percent for oil, 75 percent for LNG, and about 55 percent for coal. As Table 2-5 indicates, nuclear fuel related cost increases are generally very minimal in relation to the rising unit cost of other forms of energy production. Therefore, for a country like Japan, which is entirely dependent on foreign resources for its primary energy needs, it is particularly appealing.

Table 2-5. Comparison of Rising Unit Costs and Fuel Costs in Various Forms of Electric Power Generation (base projection to 1985 startups)



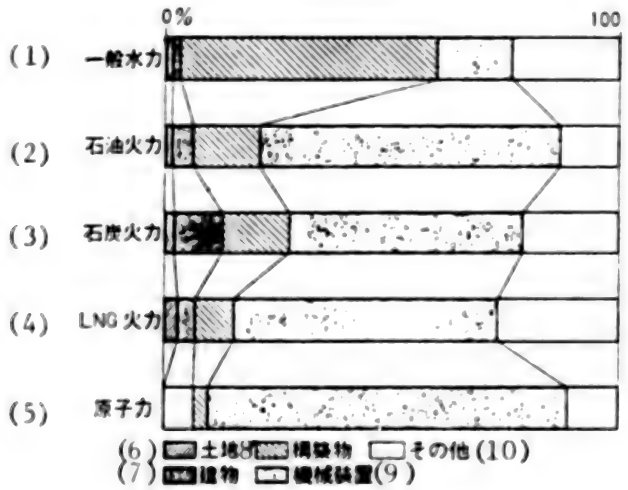
Key:
(1) Unit cost at point of supply
(2) Oil
(3) LNG
(4) Coal
(5) Nuclear
(6) Percentage of escalation of fuel costs (percent/year)

However, conversely, in terms of capital cost increases, the weight factor for capital outlay requirements per unit cost of generating nuclear electric power is a major negative influence. A major cause of this increase in capital requirements is directly related to the high cost of construction of nuclear facilities and the lower rate of operation.

With regard to the first point, the extremely long construction time involved results in a ballooning of interest costs during this period. Today, in Japan, although there are exceptions, nuclear electric power generation facilities usually require about 6 years to complete, so, compared with a normal thermal plant which can be built in 3-4 years, the effect that interest payments have on capital is great. Therefore, it is important that efforts be made for the standardization of equipment and the improvement of construction methods in order to shorten the construction period.

Second, in the case of a nuclear electric power generating plant, as Table 2-6 indicates, the weight factor for the cost of equipment is extremely high. Therefore, it is desirable to counter this by increasing safety and reliability while at the same time moving toward standardization within the plant.

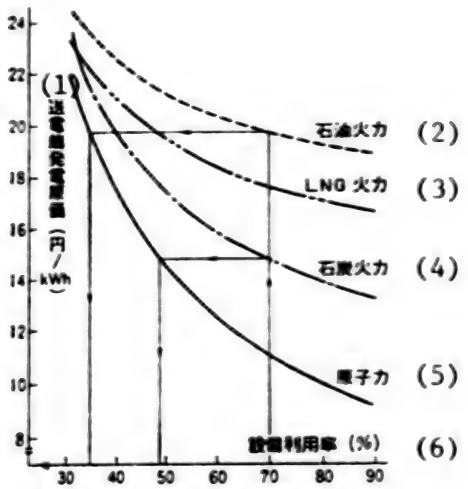
Table 2-6. Unit Cost Percentages for Various Forms of Energy Generation



Key:
(1) Hydroelectric
(2) Oil
(3) Coal
(4) LNG
(5) Nuclear
(6) Land cost
(7) Building cost
(8) Structures cost
(9) Machinery/equipment cost
(10) Other

On the other hand, the relationship between operating rate and power production cost is as shown in Table 2-7.

Table 2-7. Relationship Between Unit Power Cost and the Operating Rate for Various Types of Energy Production (plants which began operation in 1981)



Key:

(1) Unit cost at point of supply
(2) Oil
(3) LNG
(4) Coal
(5) Nuclear
(6) Use of facilities (percent)

In our country the operational utilization of nuclear electric power generating plants was 61.7 percent in 1981, which was the second year running in which we attained a record of more than 60 percent utilization of such facilities. It can be said that our country, which generally conducts detailed inspections over a 3-4 month period, has an exceptionally good performance record.

(2) Backend Expenses and the Cost of Energy Generation

In recent years there has been a rising interest in backend expenses related to the economic efficiency of nuclear electric power generation. The argument surrounding this issue is whether there is still economic efficiency when backend expenses are factored into the cost. Examples of backend expenses that can be readily cited are: the expenses of transporting and reprocessing of spent nuclear fuel emanating from a nuclear power facility, the expenses of disposal of reactors after their useful life is past, and the costs of disposal/disposition of high and low level radiation emitting materials.

As for backend expenses with regard to reprocessing costs, we are able to determine accurate figures due to the track record established through the operations of the Fuel Transport Corporation and the Tokai reprocessing facility as well as through the reprocessing already consigned to British and French reprocessors. In other words, these reprocessing expenses, which include the freight costs to the reprocessing facility and the glass-sealed disposal of high radiation liquids from the reprocessing, have all been integrated into the per-unit cost for the production of nuclear electric energy, and this is estimated to be about 1 yen/kWh.

At present it is difficult to make an accurate estimate on other backend expenses. At this time low radioactive pollutants are being stored under safe conditions within the confines of the power plants, and it is possible for this storage situation to be extended for a considerable time. However, in the future, it is planned to follow the basic policies determined by the Nuclear Energy Commission, and disposition will include both land and sea disposal. The preparations for acquisition of appropriate areas are currently underway. In order to make accurate estimates of these costs in the future it is necessary to decide the proportions for sea and land disposal, and detailed estimates must be made for building the required facilities for land disposal. As progress is made in this type of preparatory work, the related costs will become more clearly focused.

It can be said that the cost estimates for the storage and disposal of high level radioactive materials, when compared to low level radioactive materials, are much more complex.

The high level radioactive materials resulting from reprocessing are glass sealed and must be stored for several decades in order to lower the radiation levels and the heat. Final disposition as planned will be for burial at a depth of 1,000 meters underground.

The glass sealing expenses are a known factor and accurate estimates can be derived so, as explained earlier, these are always included in costing figures, but with respect to storage and ultimate disposition, the problem is now being studied vigorously from a long-range point of view by the Fuel Transport Corporation and the Japan Nuclear Energy Research Institute. It is expected that more time will be required for specific recommendations to be forthcoming.

Because of this, for purposes of this article, I would like to introduce estimate examples for costs related to disposal of materials worked out by the working group of the International Nuclear Fuel Cycle Evaluation Committee (INFCE). This is a case study wherein costs were derived by estimating the cost of nuclear waste materials derived at all stages of the nuclear fuel cycle; after total costs were computed, the per-unit output costs were estimated. However, these estimates are based on a case study in which the low and high radiation level waste materials coming from a nuclear plant were disposed of in bedrock and they cannot be said to be applicable to the radioactive waste disposal program of our country. It is, however, one of the few concrete examples of cost estimates for this problem. According to this report, the cost of disposing of radioactive waste material, including both the low level radioactive material from the generating plant and the radioactive debris from the reprocessing is estimated at 25-30 sen per kWh.

As stated previously, it would probably be difficult to apply this directly to our country's situation, but it is understandable that the cost of disposing of radioactive materials is not a terribly big factor.

Next, let us take up the question of reactor shutdowns. Even the oldest of the nuclear electric generating plants in our country has been in operation only about 10 years, so the question of their ultimate disposition is not one that will confront us in the near future. However, it is important to have a clear

idea of how a shutdown reactor is to be safely and permanently disposed of, so this question has come to be of rising concern in recent times.

There are three ways plus a combination of any of these ways to tackle the problem of the shutdown of a reactor: 1) sealed custody method; 2) shielded isolation method; and 3) dismantling method.

This type of reactor shutdown procedure has many precedents, albeit minor in scope, in the nuclear energy advanced countries, so there is a store in technology in this regard. In the United States, there is experience in having closed down 6 nuclear electric power generators, 4 operational reactors, 6 experimental reactors and 50 research reactors. Great Britain, France, West Germany and Sweden also have close down reactors. We also have experience in closing down research reactors, so this technology, it is believed, can be applied to the closing down of high volume nuclear electric power generating reactors.

In this manner, it is conceivable that present day technology is sufficient for coping with the shutting down of a reactor. However, the government, in order to further assure safety and with a view to maximum economic efficiency, as well as leaving the site of the closed down reactor suitable for continued use as a nuclear power generating facility, is pursuing the development of reactor shutdown technology and related matters.

With regard to the shutting down of a reactor, the type of shutdown method, are preconditions that allow for a great deal of latitude in estimating costs. According to estimations by foreign countries, the immediate dismantling method of closing down a reactor runs from a few percent to 20 percent of the construction cost of the reactor facility.

From these factors it is difficult to arrive at a definitive evaluation of the cost of closing down a reactor, but it is believed that it will be in the neighborhood of 10 percent of the electric power generation costs.

The Economic Effectiveness of Nuclear Energy Development, Etc.

(1) The Regional Economic Effect Contingent on Nuclear Development

While blessed with a beautiful and bountiful natural environment, regional progress has left the towns and villages as pockets of backwardness in basic preparedness. To such areas, what kind of economic effectiveness does the establishment of a nuclear electric power plant offer?

Of course, concurrent with the setting up of a nuclear electric energy plant, the prime concern is the attainment of safety and preservation of the environment. But also it is a certainty that the plant's existence will have varied effects on the local economy and society; in other words, the region's finances, employment and business will all be affected. Let us review some specific examples.

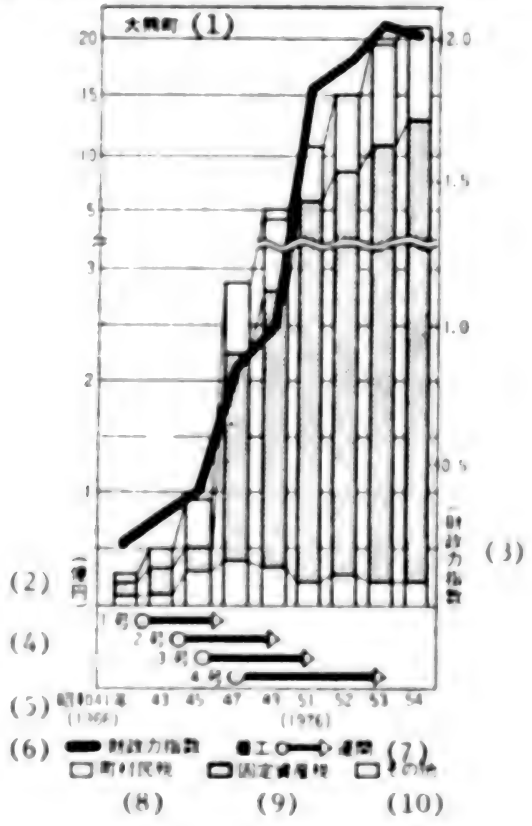
A) Contributions to the Finances of the Local Economy

As a direct effect on the finances of the local economy, under the provisions of the three laws relating to power generation, the local village, town or city (including neighboring entities) receive grants from the Electrical Power Establishment Promotion Countermeasures Fund starting from the inception of construction to 5 years after completion of construction. This grant is used for the maintenance of public properties in the affected areas. Starting in 1982 it is anticipated that this grant fund will also be used for the maintenance of commercial promotion facilities such as industrial canals and industrial parks.

This Electrical Power Establishment Promotion Countermeasures Fund grant to the local body where a nuclear power facility of say, 1 million kWh is to be built, will be in the amount of 3.15 billion yen. Neighboring towns and villages will also receive an equal amount, for a total of 6.3 billion yen in grants. It goes without saying that with the start of construction the population will increase as well as the number of related businesses that will move into the area, thus giving the local autonomous body a bigger tax base and therefore a larger income.

Next, when the power plant is completed, the real estate taxes derived from the facility form a large source of funds for the local body, paving the way for it to become fiscally independent. Table 3-1 shows a representative growth pattern of financial revenues for local towns and villages where nuclear power facilities exist. The sudden rise of financial strength indicators (financial requirements to average tax revenues) is shown from the time the power plant construction began through the time it went on line.

Table 3-1. Town and Village Tax Revenues and the Trend of Financial Strength Indicators



Key:
(1) Okuma Town
(2) 100 million yen
(3) (Financial strength indicator)
(4) No 1, No 2, No 3, No 4
(5) Showa (1966)
(6) Financial strength indicator
(7) Construction start--------On line
(8) Town/village resident's tax
(9) Real estate tax
(10) Other

6) Effect on Employment

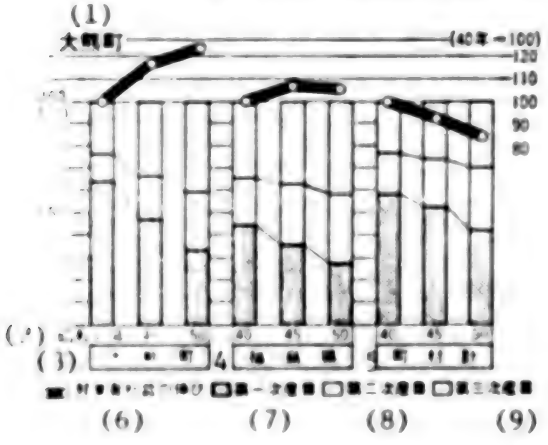
Normally, the construction of a nuclear electric power facility requires about 6 years to complete. During this period, although subject to the size and site requirements of the plant, an average of 2,000-3,000 persons per unit are required. In the case of the Fukushima No 2 Power Plant, where four units were under construction at the same time, upwards of 10,000 persons were employed.

Also, the daily spending of people peripherally concerned with the plant construction in such fields as material and machinery procurement adds to the employment prospects in the local area while giving the area a look of prosperity. After the power plant goes on line, besides the regular employment opportunities provided to operate it, many people are given work of a temporary nature when annual inspections of the plant are made. In particular, at the plants where more than one unit is in operation, if the inspections are scheduled in sequence, high employment is almost a normal state.

Also, aside from these high employment benefits, since 1981 incorporated into the three laws relating to power generation has been a special grant fund for power generation establishment countermeasures; its funds are allocated to local bodies to promote employment activities. As one facet of this program, with regard to prefectures that export electricity, the nation, depending on the volume of electricity exported, provides grants ranging from 50 million yen to 400 million yen. The purpose of part of these grants is to provide low-interest long-term capital investment loans to local concerns wishing to start new businesses in the area.

Table 3-2 shows the increase in employed individuals and that the establishment of a nuclear electric power plant contributes greatly to the increase in employment.

Table 3-2. Overall Employment Compared to the Employment Structuring in Various Industries



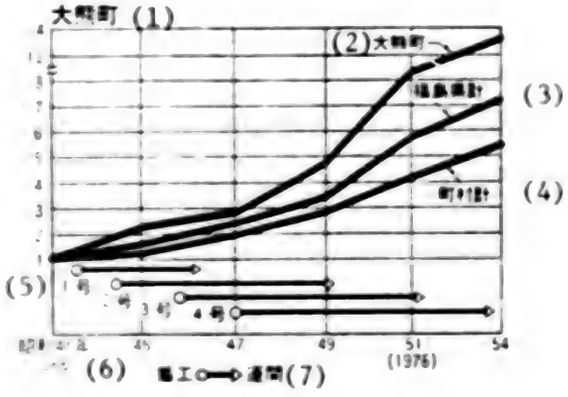
Key:
(1) Okuma town
(2) Showa Year
(3) Okuma Town
(4) Fukushima Prefecture
(5) Town/village total
(6) Growth of overall employment
(7) Primary industries
(8) Secondary industries
(9) Tertiary industries

C) The Vitalization of Business

When the construction of a power plant begins, many workers and people affiliated with the plant come to the town or village and its environs. Because of this, in addition to the vitalization of the flow of retail trade to accommodate the daily needs of these people, the construction needs of the power facility itself in terms of materiel and supply purchases are made locally, so by both direct and indirect means the local business community is favored with a great vitalization.

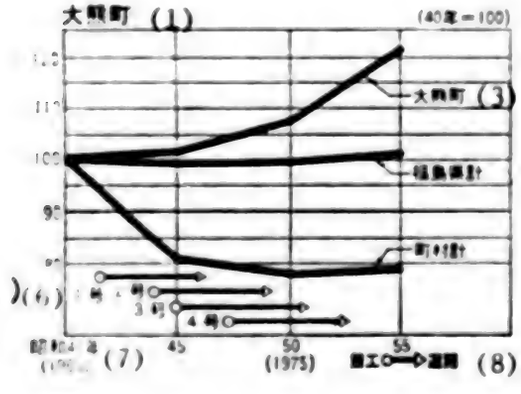
Table 3-3 shows the business sales volume trends of areas where nuclear electric power facilities are located; it is evident that in such areas the business sales volume is higher than the average increases in other parts of the prefecture.

Table 3-3. Trends in Business Sales Volume.



Key:
(1) Okuma Town
(2) Okuma Town
(3) Fukushima Prefecture
(4) Town/village total
(5) No 1, No 2, No 3, No 4
(6) Showa Year (1966)
(7) Construction start---operational

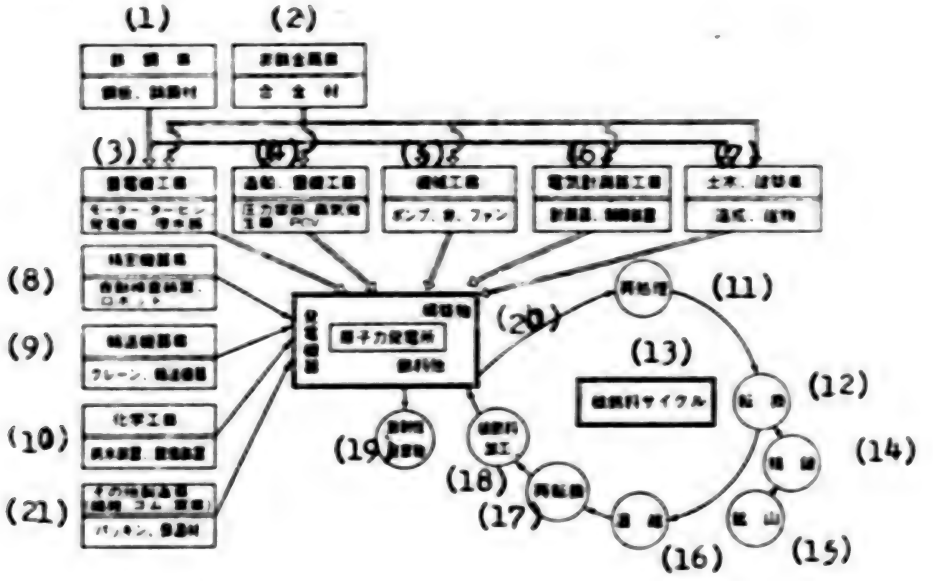
Table 3-4. Population Trends



Key:
(1) Okuma Town
(2) (Showa Year 40 = 100)
(3) Okuma Town
(4) Fukushima Prefecture
(5) Town/village total
(6) No 1, No 2, No 3, No 4
(7) Showa Year
(8) Construction start---operational

In this manner, as has been said previously, the establishment of a nuclear electric power generating facility greatly contributes to the enhancement of the local and regional economy. From the standpoint of the government, all aspects of administration, including enactment of the three laws relative to electrical power and the tax system, were given due consideration and these results as well as other statistical data attest to the validity of this thesis.

Table 3-5. Nuclear Energy Industries Associated With Nuclear Electric Power Generation

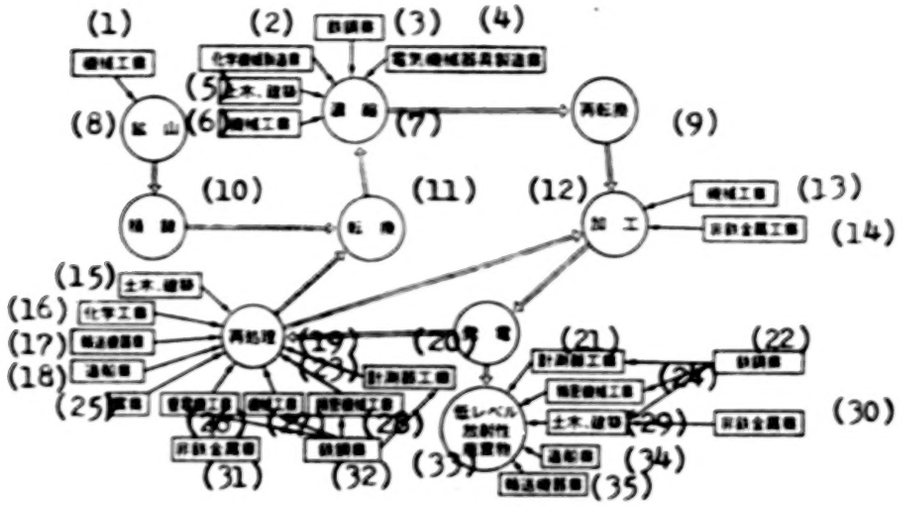


Key:

(1) Iron and Steel Industry
Steel plats, tempered castings
(2) Nonferrous Metals Industry
Alloys
(3) Heavy Electrical Machinery Industry
Motors, turbines, generators, condensors
(4) Shipbuilding, Heavy Equipment Industry
High pressure containers, heat exchangers, PCV
(5) Machinery Industry
Pumps, valves, fans
(6) Electrical Instruments Industry
Instruments, control equipment
(7) Civil, Construction Industry
Reclamation, buildings
(8) Precision Instruments Industry
Automatic inspection equipment, robots
(9) Transport Equipment Industry
Cranes, transport equipment
(10) Chemical Industry
Water purifiers, desalinization equipment
(11) Reprocessing
(12) Conversion
(13) Nuclear fuel cycle
(14) Refining
(15) Mining
(16) Enrichment
(17) Reconversion
(18) Nuclear fuel production
(19) Radioactive waste material
(20) Nuclear Power Plant
Electric Generators
Construction materials
Fuels/etc
(21) Other Manufacturing Industries (textiles, rubber)

Packing, gaskets, insulation

Table 3-6. Nuclear Energy Industries Associated With the Nuclear Fuel Cycle



Key:

(1) Machinery Industry
(2) Chemical Equipment Industry
(3) Iron and Steel Industry
(4) Electrical Equipment Industry
(5) Civil/Construction Industry
(6) Machinery Industry
(7) Enrichment
(8) Mining
(9) Reconversion
(10) Refining
(11) Conversion
(12) Production
(13) Machinery Industry
(14) Nonferrous Metals Industry
(15) Civil/Construction Industry
(16) Chemical Industry
(17) Transport Equipment Industry
(18) Shipbuilding Industry
(19) Reprocessing
(20) Generation of Power
(21) Measuring Instruments Industry
(22) Iron and Steel Industry
(23) Measuring Instruments Industry
(24) Precision Machinery Industry
(25) Kiln Industry
(26) Heavy Electrical Machinery Industry
(27) Machinery Industry
(28) Precision Machinery Industry
(29) Civil/Construction Industry
(30) Nonferrous Metals Industry
(31) Nonferrous Metals Industry
(32) Iron and Steel Industry
(33) Low Level Radioactive Wastes
(34) Shipbuilding Industry
(35) Transport Equipment Industry

(2) Development of Nuclear Energy and Its Contribution to the Industrial Economy

In order to further nuclear power generation it is important to promote the advancement of the nuclear energy industry which forms its basis. Then, what is the nuclear energy industry? Specifically it is comprised of: 1) industries producing the nuclear power generating machinery; and 2) industries concerned with the nuclear fuel cycle such as enrichment, production and reprocessing of spent nuclear fuel. As can be seen in Table 3-6, they are almost all high technology industries related to general industry.

Of prime concern to the nuclear energy industry is for the nuclear energy equipment industry to overcome its accumulated deficits and to make its management sound. According to a study by the Japan Nuclear Industries Council, 1980 sales are reported to be about 500 billion yen, but this is expected to increase in the future.

Next, with respect to the manufacturing capacity for nuclear power generation equipment, it is said to be in the neighborhood of 6 million kilowatts. Our domestic capability is said to be more than 90 percent of this figure. In the future, based on our own technology, and, along with safety, we must strive to increase reliability and operating efficiency even more.

Third, with respect to the nuclear fuel cycle, with the exception of a part, we are reliant on foreign countries. However, our own research results are gradually beginning to have an impact, and these results are close to being put to commercial use. Even from the standpoint of becoming self-sufficient in the nuclear fuel cycle, the nuclear energy industry has a major role to play.

Next, to give commercial nuclear industrial activity its own characteristic indexes, we use figures for nuclear energy research investment. In 1980, according to the Japan Nuclear Industry Council, the research investment total was 6.4 percent of capital, which in comparison to general industry's 1.6 percent is at a considerably higher level. (Space industries in 1979 spent 3.3 percent on research.) Because of this level of R&D investment, current profit levels are not great, but on the other hand, it can be said that the foundations are being laid for future expansion.

In addition, in the future, with the sustained upgrading of our technology and the strengthening of the structure of our nuclear energy industry, we can look forward to the export of nuclear equipment parts and eventually to the export of nuclear electric generation plants themselves.

In this manner, we can contribute to the world's development of energy alternatives to oil and in particular we can play a big role in economic assistance to oil-deficient countries in the form of providing stable energy sources.

In any event, nuclear energy related exports must take into full consideration nuclear nonproliferation and the management of high technology. There are many problems unique to nuclear energy not evident in other types of plant exports.

Finally, with respect to nuclear energy production, whereas heretofore all of the effort by our country has been in increasing safety, it is gratifying that we have reached a point in the development where we can discuss its economic efficiency. However, we must never forget that economic efficiency exists only because safety is present, so we must constantly strive to upgrade safety and reliability.

Takahashi Hiroshi, councilor, Secretariat of the Energy Resources Agency.

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